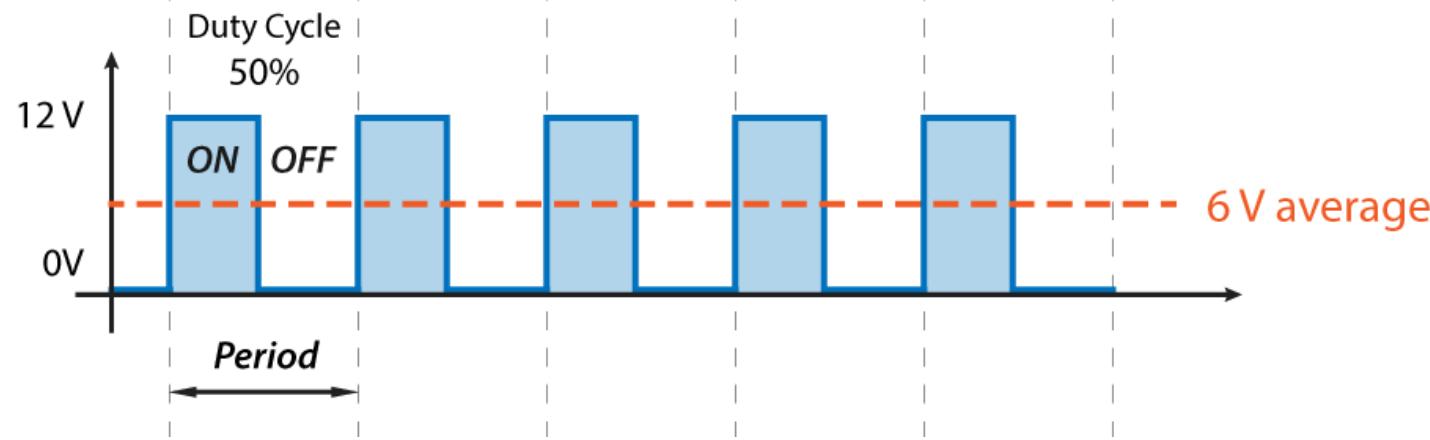
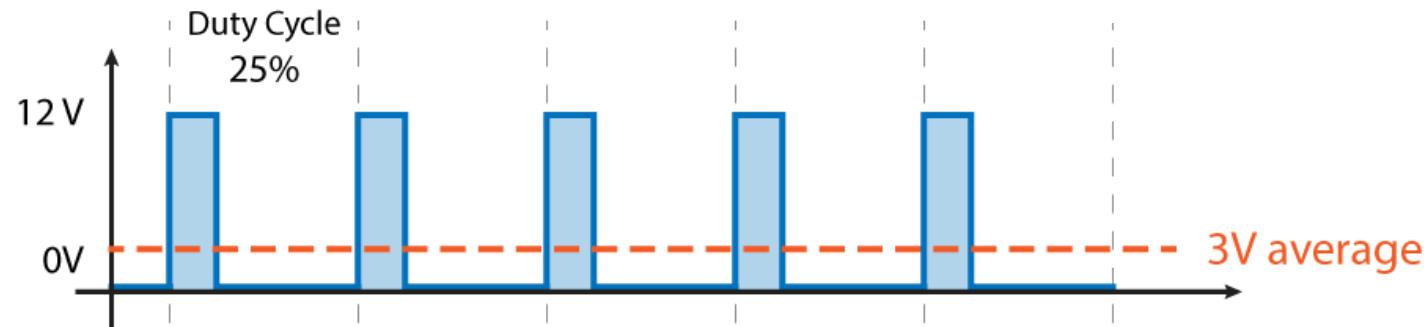


Input/Output  
<PWM - Input>

# What is PWM?

Pulse Width Modulation



# Making PWM Pin (Analog Output)

PB.5 → Arduino Uno pin 13

```
int i=0;
```

```
while(1){  
  while (i<=15000) {  
  
    PORTB=0b00100000;  
    _delay_ms(0.01);  
    PORTB=0b00000000;  
    _delay_ms(0.09);  
    i++;  
  }  
  i=0;
```

# Making PWM Pin (Analog Output)

PB.5 → Arduino Uno pin 13

```
int i=0;
```

```
while(1){  
  while (i<=15000) {
```

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    PORTB=0b00100000;  
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    PORTB=0b00000000;  
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    i++;
```

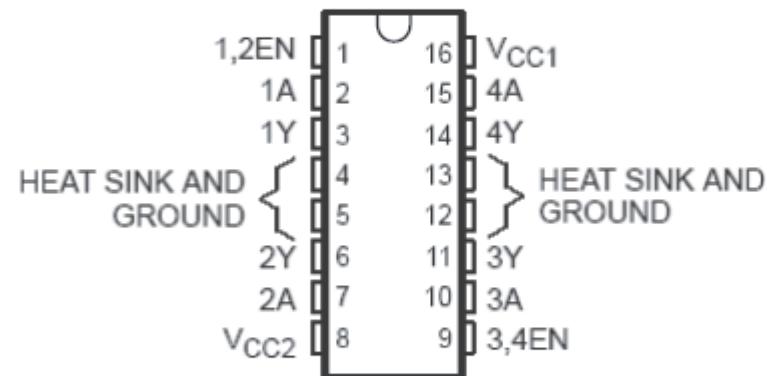
```
}
```

```
i=0;
```

Approximately more than 1.5 seconds

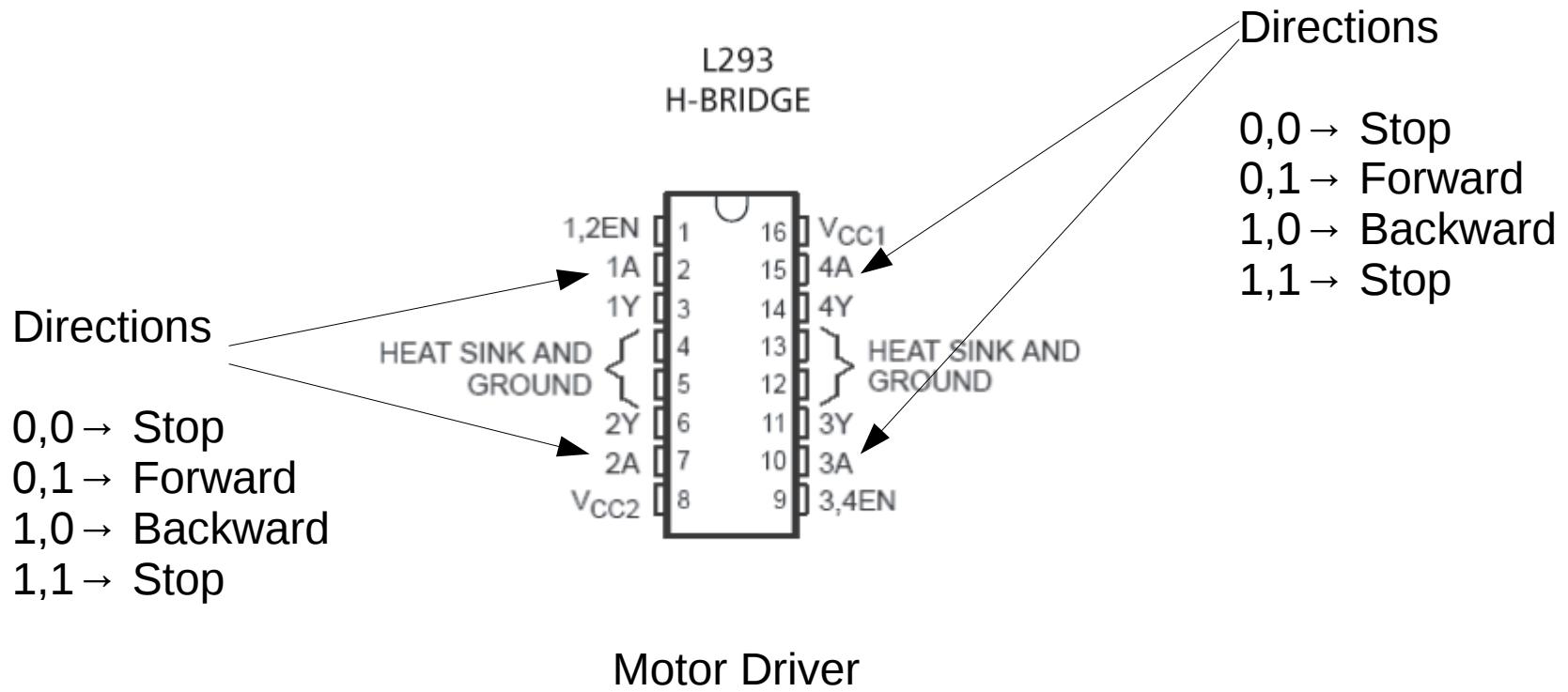
# Motor Control

L293  
H-BRIDGE

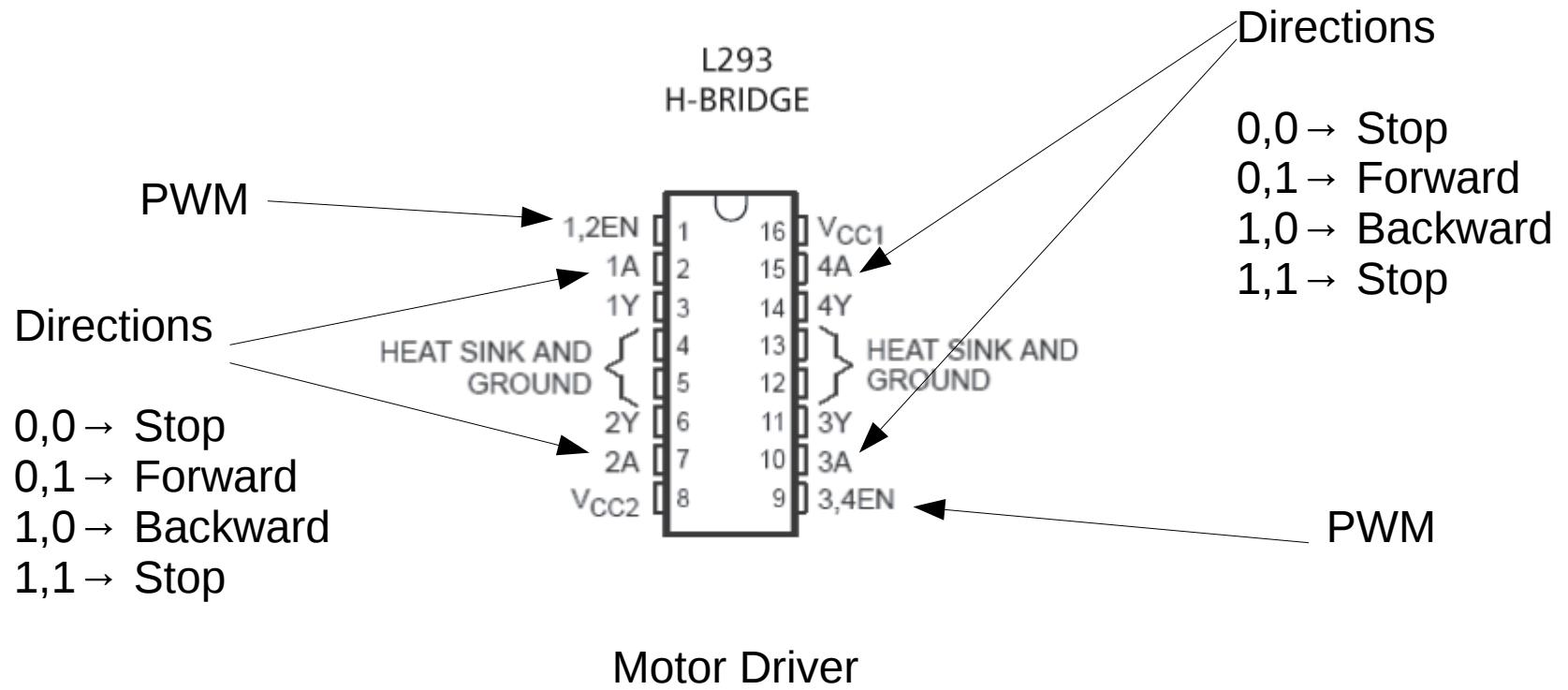


Motor Driver

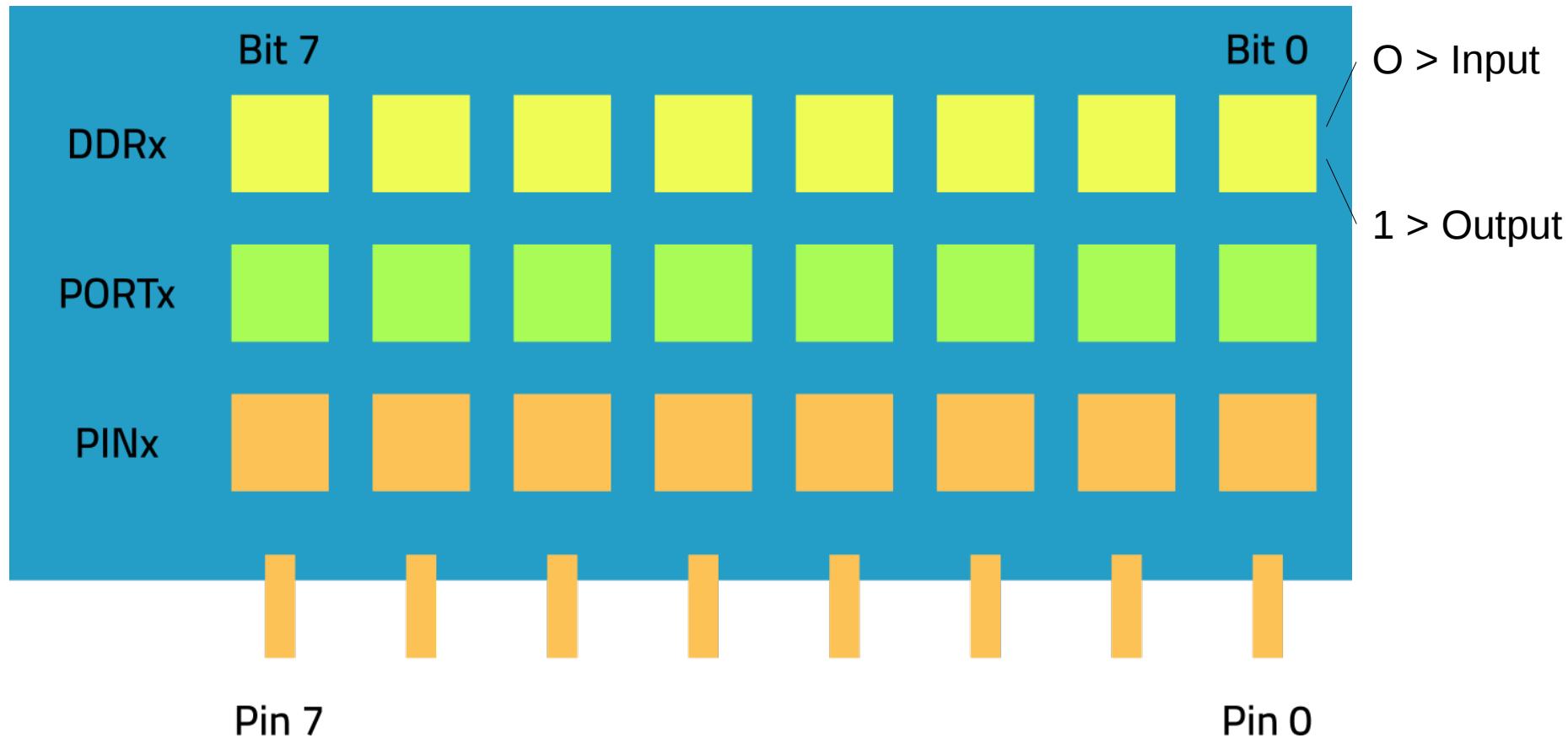
# Motor Control



# Motor Control

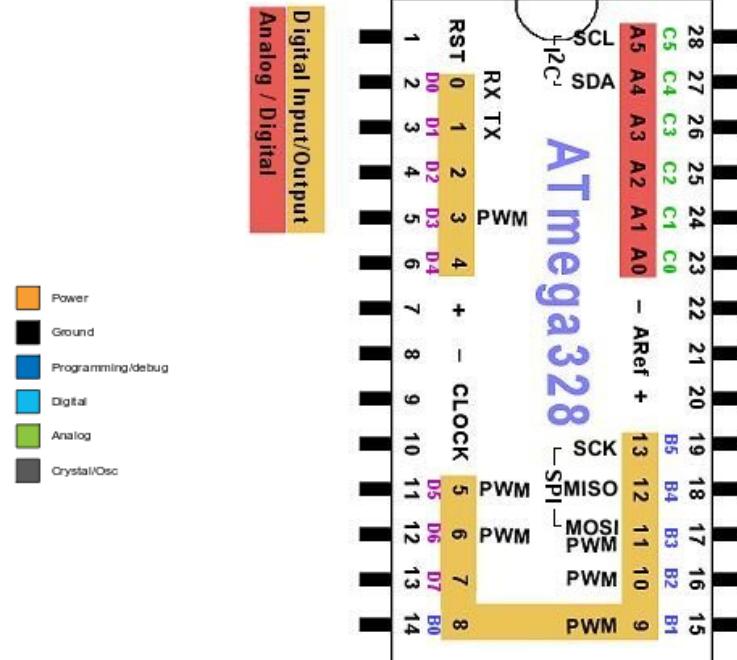


# DDR – PORT - PIN



# Map between MCU and Arduino

(PCINT14/RESET) PC6	1	28	PC5 (ADC5/SCL/PCINT13)
(PCINT16/RXD) PD0	2	27	PC4 (ADC4/SDA/PCINT12)
(PCINT17/TXD) PD1	3	26	PC3 (ADC3/PCINT11)
(PCINT18/INT0) PD2	4	25	PC2 (ADC2/PCINT10)
(PCINT19/OC2B/INT1) PD3	5	24	PC1 (ADC1/PCINT9)
(PCINT20/XCK/T0) PD4	6	23	PC0 (ADC0/PCINT8)
VCC	7	22	GND
GND	8	21	AREF
(PCINT6/XTAL1/TOSC1) PB6	9	20	AVCC
(PCINT7/XTAL2/TOSC2) PB7	10	19	PB5 (SCK/PCINT5)
(PCINT21/OC0B/T1) PD5	11	18	PB4 (MISO/PCINT4)
(PCINT22/OC0A/AIN0) PD6	12	17	PB3 (MOSI/OC2A/PCINT3)
(PCINT23/AIN1) PD7	13	16	PB2 (SS/OC1B/PCINT2)
(PCINT0/CLK0/ICP1) PB0	14	15	PB1 (OC1A/PCINT1)



# Switch Input

```
#include <avr/io.h>

int main() {

    DDRC=0b00000000;
    DDRB=0b00100000;

    while(1 {

        if ((PINC & 0b00000100)==0b00000100) {PORTB=0b00100000;}
        if ((PINC & 0b00000100)==0b00000000) {PORTB=0b00000000;}

    }
}
```

# Build (Compile) and Burn

- avr-gcc -Os -DF\_CPU=16000000UL -mmcu=atmega328p -c -o out.o switchInput.c
- avr-gcc -mmcu=atmega328p out.o -o out
- avr-objcopy -O ihex -R .eeprom out out.hex
- avrdude -F -V -c arduino -p ATMEGA328P -P COM\* -b 115200  
-U flash:w:out.hex

# Build (Compile) and Burn

- avr-gcc -Os -DF\_CPU=16000000UL -mmcu=atmega328p -c -o out.o switchInput.c
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-U flash:w:out.hex

# Switch Input

(PINC & 0b00000100)==0b00000100  
(PINC & 0b00000100)==0b00000000

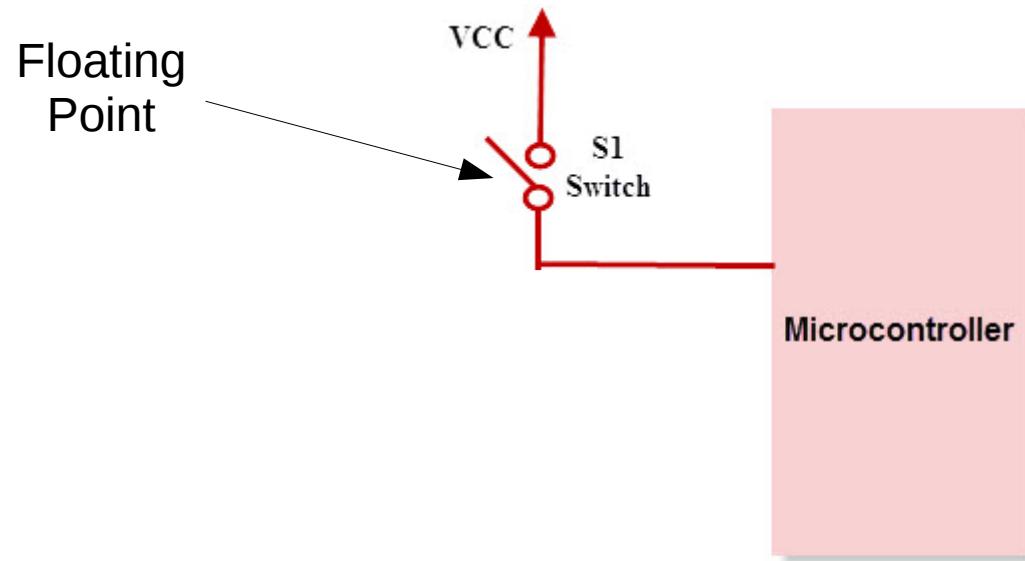
# Switch Input

$(PINC \& 0b00000100) == 0b00000100$   
 $(PINC \& 0b00000100) == 0b00000000$

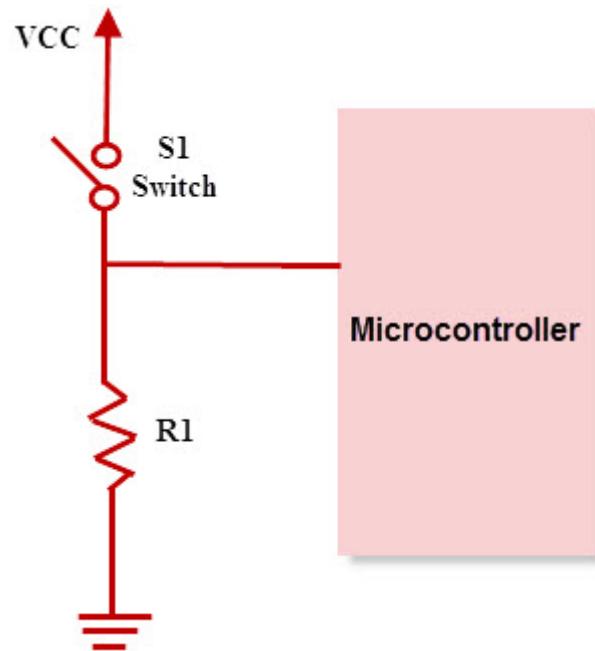
Mask

Masking

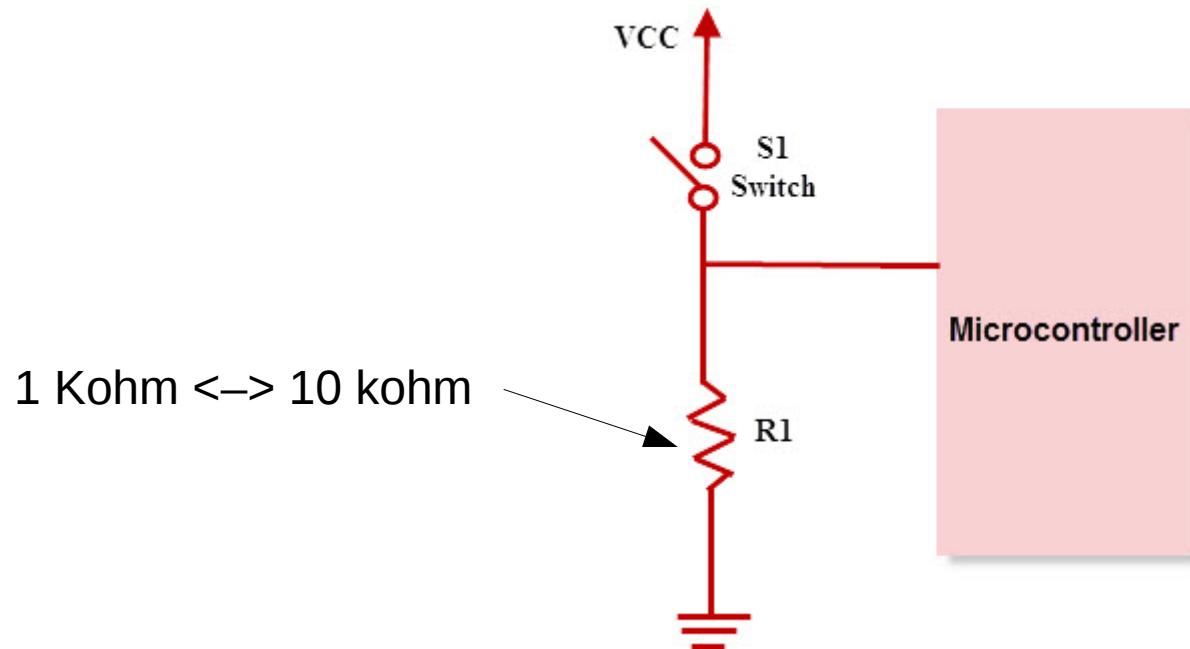
# Pull Down Resistor



# Pull Down Resistor

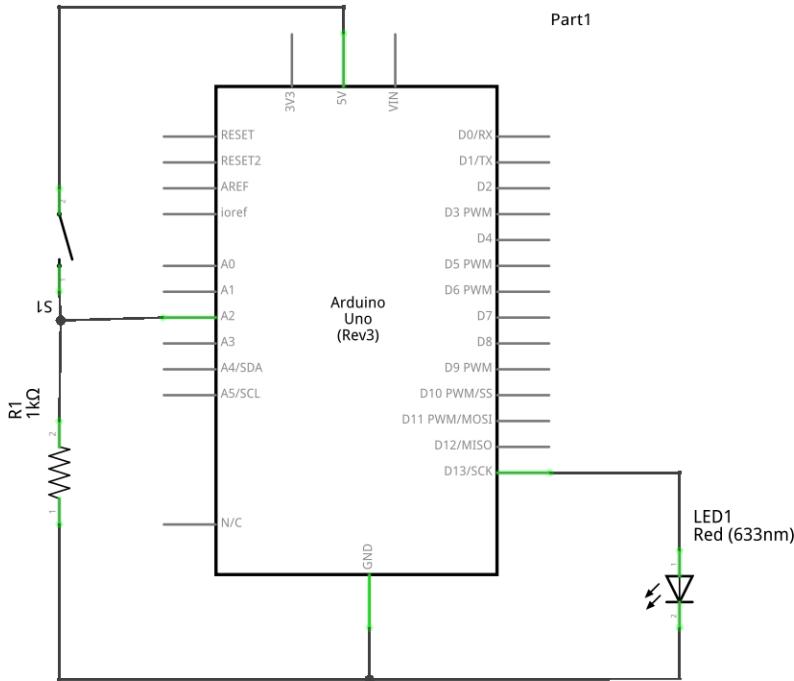


# Pull Down Resistor

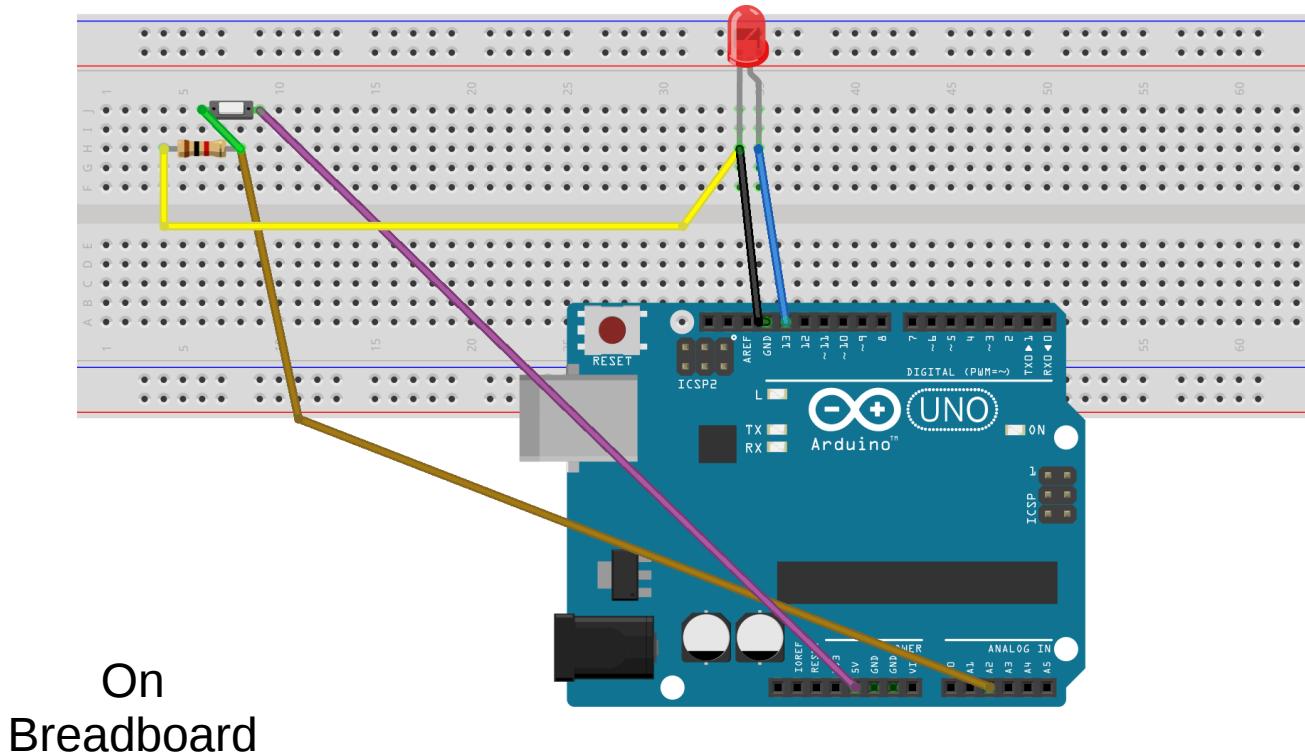


# The connections

Schematic  
Connections



# The connections



# Thanks